MD-563 1
FIELD 1951
1951 doc. 472

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

# LOOSE-LEAF FIELD NOTEBOOK

9-137

Faults in Front Range, doc. 472

# Yale University

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January 26, 2011
Ned Sterne
1981 W. Briarwood Ave.
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Dear Ned:

I've now gone through all Waage material (notebooks, maps, and otherwise) looking for the word fault. The result is that in 8 notebooks dealing with the Colorado Front Range there are 25 pages that mention faults. Some of the pages have more than one fault. Some of these faults have strike, dip, and movement direction recorded. For the record, I've listed below the notebooks and fault pages below:

| IP Document | Year | Waage Ntbk # | Ntbk Page |
|---|---|---|---|
| 472 | 1951 | 1 | 1 |
| " | " | " | 37 |
| 474 | " | 3 | 17 |
| 475 | " | 4 | 48 |
| " | " | " | 52 |
| " | " | " | 56 |
| " | " | " | 57 |
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| 477 | 1952 | 6 | 45 |
| " | " | " | 65 |
| 478 | " | 7 | 14 |
| " | " | " | 15 |
| " | " | " | 16 |
| " | " | " | 30 |
| " | " | " | 38 |
| 479 | " | 8 | 20 (+ opposite page) |
| 480 | " | -- | 1 |
| " | " | -- | 4 |
| 464 | 1955 | 1 | 8 |
| " | " | " | 9 |
| " | " | " | 11 |
| " | " | " | 30 |
| " | " | " | 55 |
| " | " | " | 61 |

I'm sending you copies of all these pages plus the complete measured section for each fault. In your copies I've put a red dot everywhere the word fault appears. Also included is a copy of one quadrangle map with two locs on it. So that we can keep track of this information a copy of this letter is being filed with our document 472 as well as the Division letter file. Let me know if you ever locate Waage's field maps and photos.

Sincerely,

Cope

Copeland MacClintock

M.D. 563 - Front Range Clay — Note Book #1
K.M. Waage Ed Taylor (1951) 6553


| | PAGE |
|---|---|
| * Van Bibber Creek Area * | |
| Geull notes | 1 |
| Section | 2 |
| Routes 40-6 section | 14 |
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| —1— | |
| * Van Bibber offset of 'little 3' | 74 |

[illegible] horse.

[illegible] 1/31/[illegible]
Ralston Butts
Kessler
Littleton

[illegible] 2 (1) N 50° W, 60° W overturned

(2) N 60° W, 85° to vertical

(3) N 5° W ⊥

(4) [illegible] N 8 E

(5) "

---

13 Wpix Roll 1
1 S side [illegible] Hogback - Deer Cr. note
2 Channelling in Dea.
3 to 7 inc Upper clay beds (Denver?) assoc SS N of Deer Cr.

---

[illegible] Dawson [illegible]) for A.E.C. [illegible]
13 Cr. [illegible]
See [illegible] location [illegible]

---

See Eckel + Kosh — about Resumption to [illegible] AEC project.

David W. Persons
Proj. Eng.
Rocky Flats Plant.
Box 2611
Denver.

Wednesday - Meet Vernes + Scott

Van Bibber Creek area - Notes.

1. Fault in roadcut just N of Van Bibber Cr
Strike of F. between N65 and N83 E, slickensides
at N55 E and slickens Ls to NE but N55E set
ll's fractures + general trend of effect down
S. + dip steeper.

2. Minor fault of about 2' displacement just
below crest about 60 feet N of by pit shaft
Strike N83E, Dip 54° S, Slicks trend NE-SW.
all measured over true fault plane.

3. Golden F. B. Co. owns mine with tipple N. creek.
Not mined out holding in reserve. contains
highest-fusing clay owned by GFB Co. Get
kol from Mayor

Van Bibber Creek section.

Pieced along S end Dakota hogback just north of Van Bibber Cr. in

- Upper ss -

ss. from top of massive (not incl. trans. beds into Graneros)

8.5 ss - med. gr. cross-laminated: hard: beds 0.5 - 0.2, ripple marks on bedding planes: colour, light gray: weathers buff → iron brown. This unit thins and thickens in chan' fash on along the strike.

ss thin bedded - (0.05' → 0.1) med & fine gr: gray: med gr beds weather buff & iron brown: partings of fine gr. gray ss & shaly ss, finely laminated. med. gr. beds cross laminated. local partings of silty shale, weathering gray and [illegible] part.

14' → 20 — basal 3': [illegible] cross laminated clean red sand [illegible] 14' measured at deepest part of [illegible]

9' ss interbedded [illegible] ss & shale beds .05 → 2.0 thick.

[illegible]

10' ± ss + clay (mur or) hard fine-gr gray argill. ss in beds 0.6 → 2.0 becoming [illegible] [illegible] argill. ss beds [illegible] [illegible] to conchoidally fracturing [illegible]

Lies above [illegible] Lies [illegible] Hackberry [illegible] as much as 10' at [illegible] of thin bedded ss

Marine [illegible] among [illegible] and 40' [illegible] before reaching [illegible]

in upper part: weather light gray with mottle iron stains. Base 1.3 is dark gray slightly silty shaly clay.

DISCONF — Breakdown: disconformity at top
TOP
0.9-1.0 .9-1.0 hard: siliceous claystone: streaks fair flint clay. [Sample 1, A, B, C.
Colour gray to dark grey with brownish stains from plant fragments
lower 3" locally a brown-gray clay shale: soft, fissile, with finely comminuted frag. plant mat'l. (equal Dry Creek Canyon clay bed ???) argill. so chunky in upper 5' of outcrop, sandier below the clod beds separated by shaly ss partings: poss. thin shale and clay also. Locally, und. ss beds form channels cutting into adjacent ss beds. Entire unit may lense out laterally along the strike
Basal clay (sample 2) is under about 6' shaly SS, 15" of shaly clay, Fe stained and more indurated at base. Rests on Fe stained surface on underlying SS.

DISCONFORMITY

5-8' fine gr light gray ss: dense in beds .6" → 2.0 + thick. stained buff to iron brown prominent vertical jointing or fracturing: gray in fresh surfaces only.
END upper ss.

DISCONFORMITY

At base of basal ss: ripple marks 6" between crests current ripple marks:

- 1.0: interbedded fine gr. shaly ss & silty mudstone. grades downward into interval below.

DISC. → 2.6: Dark gray, shaley clay becoming silty downward: weathers blue-gray: hard platy lower part. fissile in higher part.

DISC. → 1.2': hard resistant argillaceous siltstone and fine sandstones [dark to light gray (weathers)] iron stained. Fair plant frags. on beds 6-8" thick.

- 2.5: dark gray hard silty claystone: weathers blue-gray to light blue-gray. locally relatively silt-free plastic clay.

- 2.6': ss: fine gr. ss & siltstone. light gray argillaceous in upper half. light gray in lower part, darker above. irregularly bedded. weathers light gray: iron brown stain. Plant frags throughout

DISC. → 1.8 dark gray hard finely silty clay: weathers light gray to blue gray fine plant fragments throughout. [pro[illegible] small (white mat'l lined) small cavities mostly in lower half. Minute grains unidentified white mat'l: lower half.]

- 5.5' thick - ss: hard: fine gr. cross bedded light gray: weathers buff to iron brown: ripple marks on bedding planes. beds .4" → 20" thick: (may be plane surface on top but it is clearly shown) This is unit that displays excellent ripple marks on [illegible] "across the strike" (quote K.M Waage)

DISC → 4.0 shaly clay: dark gray hard somewhat silty; plastic. silty in lower part few thin beds siltstone and fine ss: light gray iron stained in lower part

2.0: ss: fine to med gr: cross-lamss: beds 0.4" -> 1.0" thick. Shaly partings between beds: bedding surface ripple marked. Weathers from brown to buff.

DISC

1.5: shaly clay: dark grey clay, weathers shaly; a few hard layers: non-indurated red coloured clay at top. Lower part very brown grey plastic clay

3": hard iron stained cross lam fine gr ss.

SKIP

~~9~~ 10"

— BREAK SECTION —

Section at airway to clay mine starts at base of 2'ss at top of this page.

1.0: shaley clay (nearly shale) grey semi

Sample 3 conchy to semi-conchy fracture: hing. plant remains. becoming silty in lower part: some areas staining in silty layers: similar to overlying.

0.3 ss: fine grain iron stained

4.0: gray silty shaley clay: conchy fracturing. plastic: scattered fine plant fragments

clay 1.5 with fine patches to yellow Fe

Sample 4 specks scattered throughout, locally concentrated along bedding planes [Iron specks concentrated in a 6-9" zone of ferruginous clay.]

0.6 to 0.9 - zone of ferruginous clay, weathers shaly: iron in specks. Core in the zone, which is first surface and on weathered surface (SPECIMEN I) this ferruginous zone marks colour change in the clay from light grey above to dark grey below.

5.3: gray and dark grey conchy fracturing plastic clay (slightly indurated) thin zones of white Fe specks in zones 3' these weather out in [illegible] layers. Local clay concretions up to 3' in diameter: used in clays in this area [illegible] for clay shale.

Sample 5 (upper 3'5")

Sample 6 (lower 2')

5'-3" bin 4)

are extreme mottling of concentration of iron specks (Specimen 2)

Sample 7 (upper 2') — 3.5 : dark grey plastic well indurated clay: as in lower part of above. some banding with laminae of very fine silt: layers of waxy weathering clay: and one iron-staining oil fractured zones in rock.

Sample 8 (lower 1½) — 1.5 : hard shaley clay: clay shale dark grey with thin beds of siltstone: iron staining common around silty layers:

Sample 9 (upper 1') — lower .6 : highly silty iron-stained with 1" of bentonite-like clay: waxy gray → light gray with Fe (?) blebs. plant fragments in top of that interval.

Sample 10 the bentonite

---

Break in section: begin at top with bentonite bed: 50' W of the first ledge outcrop of middle warrior stone. Above tipple.

.1 Bentonite

2.3' gray to dark gray argillaceous siltstone minor amounts fine ss in upper part. some interbedded silty claystone.

1.6' dark grey silty claystone: (Sample 16)

.6' hard gray finely sandy siltstone

.7' gray silty clay local beds of siltstone

1.2' dark gray finely silty clay lower .4 silty brownish clay with plant frags. (Sample 17)

[illegible], not [illegible] angular [illegible]
[illegible]. [illegible] [illegible] [illegible]
[illegible] shows following section from
base [illegible] down

1.1 [illegible] shale [illegible]

.6 [illegible] claystone [illegible] ?

Sample 18

1.7 [illegible] gray [illegible] clay [illegible]
[illegible] of silt. Brownish clay [illegible]
[illegible] .3

.3 White very plastic clay, bentonite-like

Sample 19

2.5 [illegible] dark gray [illegible]
mottled plastic clay [illegible]

.3 [illegible]

.5 [illegible] clay

Sample 20, composed of [illegible]
[illegible]

3.7' siltstone with sandy layers: hard, resistant, and irregularly bedded locally: more or less argillaceous: becomes white some places along the strike: gray and brown gray: weathering light gray with iron staining.

.6 Obscured: probably clay or soft siltstone.

? ? TOP OF MIDDLE SANDSTONE ? ?

combine all these

4.2' 21.7 predom. siltstone with some fine ss: irreg. bedded. locally ledge forming with unit below.

2.2'
4.3'
2.5'
3.5'
3.6'
1.4'

fine-gr. ss locally silty irreg bedded in beds 4" → 6" thick: mostly thin bedded. local massive appearance still shows lamination. whole ss may be cross bedded.

3.3 Interbedded siltstone and fine sandstones, some and silty clay [illegible] beds ss up to 6' thick, silty sh beds [illegible] siltstone increased downward.

See above

40.8 Top of ss: light rusty brown: fine grained well indurated: changes from light rusty to white to light rusty down thru the bed: grain size coarsens locally: dv. fine gr. throughout. rusty zones average about an inch each: rusty zones slightly more resistant to weathering: whole sandstone thinly laminated: interbedded throughout with more resistant zones of forming more ss non-ferruginous zones weather white. (This unit not [illegible] slope.) Has some [illegible] zones which [illegible] 3' [illegible] the [illegible]

13.3' Sampled:
siltstone and silty clay. thin layer siltstone in upper ½'. Dark gray locally iron stained: plant fragments. Weathers a light blue gray.
Sample 21: upper half
Sample 22: lower half

.6' med. gr. ss, iron stained with hard cap of Fe cement in upper half inch. Disconformity may be at the top of this sand layer or between it and the sandstone below.

1' clayey siltstone: soft light gray on weathered slope.

2.5' ss: soft, friable, thin bedded, with Fe stains: stain from Fe specks. Coloration of numerous grain size particles scattered throughout. Local beds indurated (this similar to ss unit above overlying siltstone: relationships here may be strictly local)

21' ss: fine grained thin bedded irregular bedding planes beds (.1 → 1') gray finely speckled with brown-weathering grain size particles. whole unit weathers platy; buff to brown; locally fairly well indurated: ledge forming. Becomes poorly indurated laterally on underlying slope. more clam and local clay conglomerate in and ss beds.

1.5 fine sandstone, sandy shale, and minor shaly sandstone.

3'± interbedded dark sandy shale with fine ss: ss speckled as above, in beds ½" to .3 (this shaly unit locally thick and less sandy laterally: see separate section of same:) (Not listed)

12.5' ss: fine grained, non, unspecified, similar to above: less thin bedded than massive beds: end beds up to three feet: poorly indurated: weathers to buff: local channelling within unit. conglomerate, iron cemented zone locally present 8'-9' feet from top. ss above this conglomerate more resistant than those below it: lower 2' becoming increasingly silty and shaly with few resisting layers: grades into underlying unit. → Underlying unit is

2' silty to sandy clay grading to finely silty clay: weathers (silty upper part) light gray with some iron staining. lower part gray with reddish mottling: may be due to weathering and not original feature.

1.2' gray argillaceous siltstone: weathers white with irregular iron stain:

3.3' silty clay: gray to light gray on weathered surface. fresh colour is brown, some iron stained streaks

9' ss: fine grained: in massive beds: cross laminated: gray to light gray: weathers buff and iron brown: surfaces take time & varnish:

2.8' sandstone and sandy shale: upper 1.5 fine-grained sandstone light gray pebble fragments. alternating with shale and fairly resistant layers. Lower part consists of very sandy gray to brown shale with numerous layers of shaly sandstone.

5' massive to very bedded fine ss: hard layers scattered throughout: light gray. weathers buff and iron brown: becomes progressively argill. in lower 2' and seems to grade into unit below: no sharp break recognizable between ss and underlying unit below.

3'→4' sandy gray claystone grading to argill ss: hard: crisply fracturing. some thin lenses of dark gray sandy shaly clay in upper part. Basal contact of this unit with underlying ss appears to be gradational.

5' ss: light gray chiefly fine grained: poorly resistant resistant with iron stained weathering with black 1 actions. May be local disconformity between this sandstone and conglomeratic ss below. Lower contact not exposed. cgl fairly fine grained.

7' so: massive: cross-bedded: fine to med gr with layers of cgl. so. up to .6' thick: separately scattered throughout: so light gray to white on fresh surfaces, with darker colored lenses where carbonaceous material present more or less surgary: only locally resistant weathers light gray with zones of iron staining.

cgl. matrix clayey but not at locality measured: 2 pronounced cgl layers. one at top: one at 5' from top; bottom layer. all clas. contains frags. of chert and so mostly so & chert & quartz in cgl

Discontormity! – the bra one

3'→4' silty clay weathered section shows varicolored silty clay with pink green & brown yellow gray layers on that weather. Below the silty clay part where layers of siltstone are lost sets of with fine grained sandstone. There appears to be a local disconformity at the top of this interval. Further

49' fine to med gr so massive cross bedded light gray to pink weathers light gray with iron stain along some surfaces and along joint planes. Pitted in Seven 12: pebbles covered by

11± so: med → fine gr friable clean resistant beds: unimaginal pelite so above but less resistant. interval includes several resistant beds with sand covered interval btw. these beds. Pitted out 5' from base & basal 2' so red brown weathering & land so that clas. or variegated clays below.

Discon f

11

silty

2.5 var. clays. red, gray & occasionally silty clay: 2½ → 3" thick (argill siltstone and sandy siltstone.

2.3 → crackly fracturing: weather light gray)

— Sundelain by more var. clay.

stop — Break in section. Bad - gradeness transition beds:

6'± from top of massive first ss of Dakota. obscured by slopewash

lower 8'

15.0 argill ss interbedded with shale. thin beds platy sandstone dark gray, weathering to light gray. 'C' staining on joint planes and some bedding surfaces. Beds up to .5' thick average about .3' thick. discontinuated partings of sandy shale and shaly sandstone.

upper 7' similar to lower 8' but increasingly shaly upward with sandstones becoming thinly laminated and grading upward into siltstones. 1' start argill. siltstone bed .5' thick capping interval.

5.7. dark gray clays shale, siltstone & light [illegible] with iron staining on surface. [illegible] touch [illegible].

.3' Bentonite

.8 hard gray, light gray weathering argill siltstone.

3.5' dark gray shale weathers pressed gray
few silty layers in lower half.

.6 siltstone and fine sandstone
thinbedded: beds up to 0.2' finely
laminated; some silty shale in
upper half.

2.7 dark gray clayey shale weathers gray, fissile
as above (book).
as in preceding interval

.5' hard dark gray argill siltstone
becoming shaly in upper part.

Above this shales not surface & disrupted by
creep. No other siltst. layers appear above, but
over 75' shale some cones locally and a
bituminous bed about 15" thick.

Route 40 Section – Outcrop [illegible] at [illegible]
and [illegible]

[illegible]

[illegible] At top [illegible]

.9 [illegible]

[illegible]

6.1 [illegible] shale [illegible]

8.5 [illegible] with [illegible]

3.2 Siltstone [illegible]
lite gray silty shale [illegible] up's, few shale [illegible]

[illegible] — Continuous without overlap or gap (with above [illegible]) [illegible] 1546.6

8.2 [illegible] with
silty [illegible]

B/SP [illegible] built to Fe brown weathering [illegible] thin
[illegible] [illegible]

.6 [illegible] gray shale [illegible]

4.0 Irreg. [illegible] with [illegible]

Lower

4.0 [illegible] to lite green

2.0 [illegible] used grain ss [illegible] x lam. Bed's [illegible] .5, [illegible] streaks at top.

2.6 [illegible] massive x lam. [illegible]
[Dip & Strike on base – N. 15° W, 60° W overturned]
sand[illegible] sugary grain[illegible] [illegible], fray[illegible] [illegible] – ? – concave-up bedding surfaces. – [illegible] beach [illegible]
Medium x lam. bed. [illegible] fray[illegible] on top ~~[illegible]~~ [illegible].

1.8 Gray clayey shale [illegible] siltstone [illegible] at base.

5.2 Sandstone, Fine grained, white, in beds .2 to 2.0 thick, but [illegible] with siltstone [illegible] sh. lamination at top, Gradd to [illegible] sh. [illegible] [illegible] to high [illegible]

1.0 Interlam. dk [illegible] with [illegible] siltstone, ~~[illegible]~~ .2 bed siltstone [illegible] alt. part.

2.4 Sandstone [illegible] massive. [illegible] x lam [illegible] bedding [illegible] .3'
Bottom surface has bl[illegible]

2.2 Interbedded (lower) [illegible] gray silty shale with [illegible] fine sandstone. [illegible] 2 [illegible]

5.0 Sandstone Fine [illegible] [illegible]

3.3 In Upper [illegible] [illegible], lower 2.3 [illegible] gray [illegible]

34.0 Fourth Medium grained loc[illegible] [illegible] ss. [illegible] cross lam. [illegible]. Bedding surfaces [illegible] up indicate [illegible] E to W movement, x lam with

foresets indicating W to E (Attitude on foresets, N 45 W, 52 W, overturned). Some erosion. well rounded

1st ss

Vert B ?

← Discont.

8.2 Clay weathering shaly blue gray, fresh it is [illegible] dk green plastic.

Lower Denis:-

3.2 - Clay, dk gray, .5 ft stained zone top.

1.5 - Clay with int. [illegible] with [illegible] to .1 [illegible]

3.2 - Clay, dk gray, .1 Bentonitic? zone at base

.3 - Siltstone.

10.+ Sandstone, [illegible] fine grain, lady chert, .5 to 1.5 with [illegible] 11 [illegible] silty [illegible] or partings [illegible]

← [illegible]

7.0 Silty [illegible] Clay [illegible] sugl. [illegible] siltstone Dk gray to [illegible] gray, [illegible] [illegible] blue [illegible], Siltstone [illegible] Siltstone beds up to 1.0 thick, [illegible] upper part. [illegible] ±0.1 in lower part, about .5 of siltstone at base.

16.0 ft Sandstone, fine grained thin bedded (.1 to 1.0) [illegible] channels [illegible] Sandstone [illegible] upper [illegible] medium grade to ~~fat~~ silty shale [illegible] to thin [illegible] increase [illegible] due. Some [illegible] clay [illegible] lower part.

[illegible] about [illegible]

7.6 Clay, weathered [illegible] shale [illegible] (up to 1 [illegible])

bed [illegible] hard [illegible] clay [illegible] 1 ft from top [illegible]
includes hard [illegible] silt, perc. [illegible] 1.5 [illegible]
layer. 3 ft from top in .1 layer silt
white [illegible] gray [illegible] be [illegible]
[illegible] gray [illegible].

4.2 Silt [illegible] silt, broken [illegible] layers [illegible]
[illegible] beds .1 to 1.0, [illegible]
[illegible]

observed.

8.8
3.2
.8
2.9
4.0
[illegible]

1.8
2.3
3.0
2.6
2.6
3.7
1.0
4.0
3.4
3.0
[illegible]
1.8
4.0
2.1
[illegible]
2.4

45.0

[illegible]
[illegible]
[illegible]
[illegible]

[illegible]

Morrison section N side Bear Cr. Gap on slope above highway

Surficial material

23.3 Sandstone, massive cross-bedded + cross laminated, fine grained. Many intersecting channels. Gray, weathers buff to tan [illegible]

discont

3.3 Silty dk gray shale and siltstone, beds of laminated siltstone (light carb) up to .5 in upper foot ±½. Middle foot most [illegible] dk gray silty shale, lower shly silt.

1.6 Fine grnd ss with silty laminae. Weathers with greenish cast, very hard [illegible]

1.7 Hard dk gray, to black argillaceous shale, conchoidal fract.

2.8 Sandstone, fine grained, argillaceous in upper 1.5 to 2 ft. Argill part weathers round, the gray breaks reach to semi-reach, grades down to harder compact ss which weathers left, irregular.

discont - Capped [illegible]

45.0 Sandstone, [illegible] cross laminated, hard, fine + lo. med-grained, many intersecting channels, ripple marked [illegible] Some coarse [illegible] conchoids of shale [illegible]

11.7 Interbedded silty shale + fine sandstone [illegible] 3.6 is [illegible] dk shale, loc. [illegible] with interbed fine sandstone up to .6. [illegible] Some [illegible] with some [illegible] dk [illegible] gray [illegible]

1.3 to 2.8 Arg [illegible]

dark gray. Varys in thickness laterally.
Silty claystone with beds [illegible] silt
grades [illegible] argill siltstone [illegible]
conch fracture

9.0 Interbedded [illegible] fine grained light [illegible]
sandstone (medium hard) with argillaceous siltstone
[illegible] is blue gray) Interbedding
irregular most common top [illegible] 2 feet [illegible]
[illegible] slaty, shaley to silty shale.
Light gray [illegible] fragments.
Altho local discont betw. this & ss below flat
are similar - spec where argillaceous bed of
this unit punch out later, [illegible]

13.0 Sandstone, fine grained to silty, lam [illegible],
similar to above & locally [illegible]
with -, the above has silty clstn ptings
& this does.
Both not [illegible] but local [illegible] to
[illegible] slope [illegible], with
cross lam minor [illegible]
clstn [illegible] well [illegible] gray
with [illegible] bedding.

5.8 Interbedded silty shale, dk gray, with shaly siltstone
Silty [illegible] members mostly FE stained, [illegible]
[illegible] up to .3.

S[illegible] Above [illegible] only upper
part of [illegible] siltstone [illegible] 25 [illegible]
[illegible] exposure [illegible].

OUT IN TYPE

Supplement [illegible] section - [illegible]
[illegible] exposure. Meas. from bas of ss unit (9.0)
shown above.

(9.0+1.[illegible]) Sandstone
14.0 Interbedded [illegible] with
[illegible] 9.2 [illegible]
above [illegible] more shaly [illegible] ward.

5.4 Dark gray [illegible] silty clay. 1/2" Bentonite? at base

0.8 Dark gray clay, with few layers of silt

4.0 (Interbedded) [illegible] with silty shale. Shale lt gray. Siltstone in thin beds, up to ".2. Silts at top heavily Fe stained, red to orange. Most siltstone in upper 1.2', lower part of bed dk gr with laminae to 1/4" ~~beds~~ scattered siltst. beds.

Trench

7.2 (Irregularly bedded) siltstone & fine sandstone, thin irregular layers of silty clay. Weathers to crumbly gray, but + Fe brown. Plot 2 lower layers locally but underlies steep slope.

Trench 1.4 Dark gray silty clay, [illegible]

9.7 Sandstone as in 7.2. Only upper exposed lower, not under wash-trench but no good face seen.

Suppl. Section

From 1.4) shale between crumbly ss. (weathers to [illegible] stone [100'+.]

1.4 Dark gray silty shale, [illegible] as in 7.2.

21.1 Slope [illegible] crumbly ss [illegible] ledges of stone like as 7.2 [illegible] about 5 to 6 ft is locally silty, [illegible] siltst. [illegible] ss

Trench 2.8 Gray, argillaceous siltstone + silty clay, weathers blue-gray.

2.0 Crumbly ss + siltstone, argillaceous in lower half.

Trench 4.1 [illegible] shale [illegible] with few [illegible] and irregular [illegible]. Lower .6 is silty [illegible] shale.

7.6 Sandstone, fine grained, uniform, thinly laminated, thin bedded, bate X bedded and X lam. Intersecting chann. s. Lamination distinctive, weathers light to brown to orange [illegible], color from grains a luminent [illegible] from [illegible] contrast. [illegible]. Minor sand ptings at base [illegible] channels.

1.4 Dark gray to black shale, clay, very silty in upper 3". Carbonaceous zones.

3.0 Sandstone, [illegible] to also g 7.6. In upper 1.6 then grading thru [illegible] clay shale to sandy dk clay

0.4 Dk gray to black sandy clay

3.3 Sandstone, [illegible] in upper .7, [illegible] locally, massive, irreg. weathering, [illegible] frags. Is fine grained. [illegible] silt

.5 Bed of bituminous clay, black — (may locally pinching out bet w ss.) up to 1.0 locally, [illegible] part the [illegible] ss interbeds.

.2 to 1.6 Gray fine grained argill ss plant frags. Grades up to bit. silt. Pockets, cherty sh cgl at base

Dissoon ? 7.4 Massive, light gray fine to medium ss may be locally graded into above unit but at lor. meas. shows discont.

---

Continuation

[illegible] ss [illegible] 20.4 with local coarse and a [illegible] cgl. Contact with the gray [illegible] argill ss [illegible], [illegible] clay stone justifies [illegible] section of [illegible] with cutoff to 93

20 — Cgl ss [illegible]

1.7 — [illegible] med gr ss. grades to

2.5 — Argill ss & sandy [illegible] clay [illegible] grades down to ss [illegible]

Photos at Brown's facility, July 2, 1951

1. Lower dir beam — Lino beam.
Hazuyss. below color changer R.B.
drives it at change.

2

3.4
3.2
5.8

Recorded

Turkey Creek section — and at.

(A) From top 1st massive ss... East old Mine entry.

32.6 Sandstone, massive cross bedded, fine-grained, buff to Fe brown lichen covered. Cliff former.

1.0 to 4.0 Sandstone, some shaly ss, softer than beds above & below, forms break in massive cliff.

39.8 Sandstone, fine grained, cross bedded, weathers buff & Fe brown lichens. Cliff former.

Discont.

13.6 Siltstone, argillaceous, dark gray, naval weathers gray brown & Fe stained, [illegible] Fract. is conch to splinter, [illegible] is bedded, loc. laminated, [illegible] subsoil. Proportion silt to clay [illegible] silt content [illegible] seen.

6.0 Siltstone, [illegible] hedge of gray [illegible] (upper 1.2, lower 2.6) [illegible] Separated by [illegible] argill. siltstone [illegible] 1.2 of [illegible]

Bottom, [illegible]

(B) [illegible] - Isolated up slope along strike.

6.0± Siltstone as above, [illegible] gray [illegible]

11.6 [illegible] siltstone and [illegible] Silt has [illegible] laminae (X-1cm) fine SS. 1.2 [illegible] gray sh 6.0 from top.

4.4 Shale, [illegible] colored [illegible]

5.2

Simple wash. May be [illegible]

4.0

3.6

4.6

3.9

2.4

R

Turkey Creek

(c) Ditch along S side of gap on slope:
Dip & Strike on platy beds N 43 W, 27-30 E

Starts from base of dual ss 6.0 [illegible]

Interbedded

22.2 [illegible] platy silts and shales [illegible]
with some beds fine [illegible] & sh
wholly laminated to the [illegible] lower [illegible]
platy, crazy, [illegible], few shale
beds, one of .2 ft about 6' from top

.3 to .6 Silty sh [illegible] platy [illegible]
[illegible] gray [illegible]

3.3 Siltstone [illegible] above (22.2)

Calculate [illegible] interval concealing clay bed.
Meas. from shale [illegible] to top [illegible] 27'
Strike of bed N. 43° W, dip 3° E
Azimuth intercept N. 12° E
(6.1) Slope distance 28 feet
Measured along N 65 W
Slope angle [illegible]
[illegible] clay [illegible]
[illegible]

1.1 Siltstone, light gray, [illegible]
shaley bed in middle [illegible]

0.4 Dark gray silty clay with bed [illegible] 3" bottom
Bentonite .2 [illegible] but thins.
[illegible] cut off.
(Sample of "bentonite")

2.0 Sandstone, fine gr., [illegible] with
irreg. bedded.

.3 Silty Sh

3.4 SS as in 2.0 above

7.5

6.

2.4

R

Turkey Creek C (cont)

2.4 Shaley clay, dark gray plastic, lacks silty beds

11.4 Irregularly bedded siltstone & fine ss. Brown to buff weath., some of siltstones ~~[illegible]~~ weather lite gray.

1.6 Silty shaley clay, dk gray, interbedded with siltstone.

5.0 Siltstone minor fine ss as above (11.4) shaley in lower foot argillaceous streaks throughout.

2.6 Silty gray to dk gray clay

6.0 Platey siltstone, thin irreg beds with shaley partings at thin beds. Middle 1.5 feet considerable silty shale with interbedded siltstone. Thin bed, fine to med gr ss at base. Fe stain.

Discont? 7.0 Sandstone massive to cross bedded, whole cross lamin.

Local Discont in [illegible] with

4.0 Interbedded fine ss argillaceous siltstone friable, basal .5 is a highly silty sh. whol weaths lite gray with ss bed [illegible] showing X lam.

6.1 Massive X lam fine ss weaths lite gray to buff.

*Discon. 9.6 Siltstone to fine ss argillaceous massive weathers lite gray to white hard but crumbly, conch to sub conch fracture. Fe stain on fract planes.

30.6 Massive X lam. lite gray [illegible] medium grained ss. Med gray [illegible] with [illegible] spots intra form cgl of [illegible]

7.7

7.8

8.0

8.8

5.4

40

R

low ledge going to [illegible] downward [illegible] recable.

7.5 Obscured wash, mostly of white [illegible], prob. friable SS.

40' Top at bedding [illegible] compact [illegible] with red stain on top beds, pitted surface [illegible] top appears [illegible] flat.
Sandstone, ~~med.~~ fine at top, ~~[illegible]~~ [illegible] cover [illegible] crown, Chiefly med. gr. with many cgl. str. [illegible] in lower 20' ~~Chert~~ (clstn pebbles, chert, qtzite, principal constituents.)
Discontinuated
Red silty clstn, sandy beds — Norrison.

Turkey Creek D.

From [illegible] to Norrison N of road
Base Dark-colors

10.8 Green to Red silty clystone.

7.8 Sandstone fairly massive Xlam. [illegible] gr. light gray weathers with brown Fe stain leads to [illegible]

5.6 Argillaceous SS and strong gray clay crumbly — steep [illegible]

3.7 Sandy gray clay [illegible] streaks SS.

5.7 Red silty clystone.

8.3 Green [illegible] & green silty clstn

0 – 1 Con[illegible] zone — sandy [illegible]

3,3
3

R

9.7 Silty gray clay, becoming an argill. siltstone in lower 1'

16.3 Irregularly interbedded Fine SS + argill siltstone lighter greenish gray, SS weath. rusty brown. SS pressure in lower 8'

Alameda

up slope above road about 1/3 way up from Morrison cut-off to roadcut at crest.

AIN 50-19

25.0 Partly thin bedded 1 to 10, locally cross bed + crosslam, fine grained SS with shaley SS interbeds in lower 6'. Weathers Buff + brown - looks like most Dak SS
~~[illegible]~~

3.3 Shaly tranquil. silt stone + silty shale. Upper 1'± lignitic silty clay, then alt. beds silt stn + shly silt stn + silty clay, all with plant frags, whole weathers lite gray. Fre, brn gray

12.0 Massive, cross lam fine gr. SS, cgl at base - some stringers near base. Weathers to gray mottly streaks [illegible], 4 ft from top is 1'± zone lignitic silty clay - along strike a couch fract gray silty clstn comes in 2 zones in same section under lignitic clay. Grades to cgl SS below

resembles base Marmarth section.

Toward crest along slope a massive buff weath SS comes in about 7' below base cgl SS. It has deep crust red FeO on it. Lith between [illegible] look like lite [illegible]

The buff ss increases in thickness along road toward crest. Its contact with red shale below is called base Dakota along strike.

Goldstein localities

South of Perry Park G. says lower shale merges with upper - so he calls it all Middle!

Boulder Morrison area - Varegated shales always below basal cgl. - lower shale in this area is black, carbonaceous.

Torch

For "excellent exposures" of lower shale see -
Dixon Canyon
Spring " " "
Cottonwood " "
and near Arkins, Colo.

☆ Not recognizeable south of Lyons.

Porter

Says intertingering of red + black shales in Arkins - Dry Creek area.

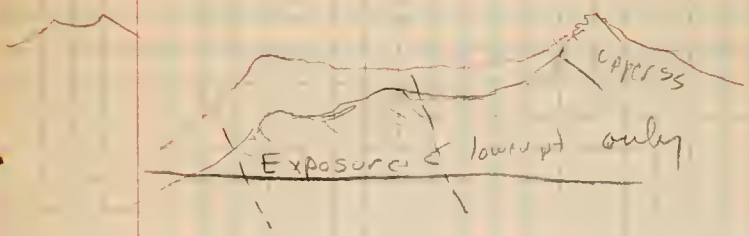
Torch

Says lower shale is included in Glencairn of Colo Springs area

NO

Also Mid ss which he thinks poops out S of Morrison area.

Fourmile Creek – Road cut. Partial section




Alluvium

1.5+ Silty gray clay shale + laminated siltstone and thin beds ± .2 fine ss

[illegible] – Discont with ? bread ripples on some structure?

7.5± Massive, fine grained sandstone with Fe specks, hard on fresh surfaces but weathers down – only locally a ledge former.

28.2 Interbedded sandstone + silty shale to siltstone. Sandstone predominates, is fine grained + ferruginous. In beds ½" to 10". Shale – shly siltstone chiefly as partings but some ½ to 2" beds and one 6" bed. SS beds commonly show feeddal structures, worm tubes? + irreg surfaces. Some cross bedding in this unit, + most ss beds finely X lam.

local discont.

3.4 Argillaceous siltstone + fine ss, irreg bedded with interbeds of sandy shale. About 6" silty sh with silt laminae at base. Weathers orange brown to gray with orange br. streaks

4.8 Dk gray silty claystone + argill siltstone uniform, conch fract on fresh. Upper 2.2 = Sample 1, lower 2.6 = Sample 2

Thin Fe stained layer(?) separates sample, lower 2.6 more shaley has fissile break.

.5 to 1. Sandstone, fine gr. dk gray, plant trays.

.3 to .7 Gray silty shale, lower .2± plastic shaley clay

→ discont ? ← Fe stained surface

4 to 6' Sandstone, massive ~~to~~ ~~cross~~ bedded & x lam, fine grained nearly quartzitic but not across grains, weathes brown.

Discont.

2.7 → 4± Silty claystone grading to siltstone and sandy siltstone. Mottled gray & lite gray, irreg silty pockets & Fe speckle. (Sample 3) Grades to ss below.

24.4 Sandstone, massive x lam. Silty in upper foot. (In beds 2.4 to 12'). Fine to coarse grained, tho chiefly med., sugary hard. (as lower ledge corner of Dek.) A .4 bed of silty lite gray conch fract. ss 6' from top.

Discont (und. surf)

1.0 ± Greenish, fine gr. argill. crumbly ss grading to ss

0 – 1.1 Fine gr. greenish-brown weath. ss hard.

Note [in exposure hard ss cut out up dip & the green zone all crumbly argill ss ± 2'

3.0 Red, argill. ss, crumbly, grading down into silty clay~~stone~~

6.8 Green silty to sandy clay

13.2 Fine to coarse grained (base 41) sugary ss. Massive, thick bed, x lam

continued

Note on Fourmile section – Could call all Cream based dk clay sh down all one unit. SS similar + clays are too, except ~~stuff~~ color changes.

6

Perry Park — Section of Upper SS of Dakota — about ½ mile NW of Rt 150 (colo).

17.8
10.6
6.5
2.9
37.8

Sandstone, massive. crosslaminated, fairly hard to fr. fine to medium grained with inclusions of fine white siltstone (looks argillaceous) and fine ss. Grainsize fine to medium downward with inclusions increasingly more frequent + larger downward, size range great - small? rounded pellets to large Euler blocks 3' diam. Lower 4 feet locally is concent. of spalls + fragments in med-coarse x lam ss. Whole weths buff to Fe brown, loc. reddish, with frags lite gray to lite br. gray. Looks like local discont.

17.8

Sandstone, massive, x lam, friable. lite gray, gray weathering with blocky weathered surface or raised joint fillings. Some of x bedding plains are coarse with coarse gr. frag. of white argill silted. but no large chunks or in interval above.

loc 2½ qtzite pebble at ↓

Irr. planed surface (basal fat of above not exposed.

6

Sandstone, fine grained, massive hard bed with irreg lam, + siltst laminae. Lite gray, weths gray with Fe brown splotches — locally joint surfaces stained black, desert tarnish.

1t

Platey siltstone

covered

Blue

ss. comes in within 10!

U.
1
17

Perry Park - Stream cut 200 + s of 150 under Dakota hogback

This is weathered on sour face - hard to tell.

| | |
|---|---|
| 7.6 | Silty clay shale; weathered, Fe stained thin beds 1.7 and 2.6 above base. lower ss silt upper? Mm bottom bent. |
| .4 | Siltstone and fine grained ss, worthy food brown |
| 2.2 | As below |
| 7.3 | Silty gray clay thin layers silt, dk gray with fish scales near base. |
| .2 | Bentonite (Sample 1) |
| 4.0 | Silty clay with silt laminae, some thin beds siltstone |

Deer Creek section – Upper Part

A (N 20° W, 55° E) Measured with stick, not direct bed to bed but close. All down to clay bed are questionable because of local faulting.

15.0 Fine grained sandstone, irreg bedded, ~~x lam~~ ~~in upper~~ Fe brown stain, lichens

+9 6 to 7 feet – as above

5'-6' – More platey, siltsty to shaley siltstone + ss interbeds., weath lite gray, some interbeds sandy shale

3' Platy fine grained ss, interbedded with siltstone.

4.7 Massive x lam brn weath fine gr. ss.

disconformity

4.0 (Probably more as small vert n fault in interval) Argillaceous siltstone minor fine ss dk gray irreg. lam. increasingly silty to base

1.0± Shaley gray siltstone + silty shale.

3.0 Fine grained lite gray ss. worm tubes in upper part (1') lower 2' becomes irreg thin bedded to laminated, silty laminae in lower'.

1.0±? Prob. was shale here but washed out

10.5 Sandstone fine gr x lam br weath hard for about upper 3'. Then saddle with wash + platey, sandy siltstone, fine ss + thin beds silty shale.

2.5 to 10' Sandstone fine grained x lam lr v bed weaths Fe brown to buff, lichens. A channel ss thickens abrupt + along strike.

9.0
8.
2.7+
.9
1.4
.9
1.8
20.2

descent.

7.5 Dark gray to black silty clay and siltstone
Silt occurs mixed and in thin beds + laminae locally. basal .6 is brownish
Sample 1 lower 2.6 to .6 prob due to sand content which increases downward in the lower .6 + grades into unit below.

1.0 Siltstone, beds 1 to .4, laminated to massive, locally sandy. weaths lite gr.

3.2 Shaley clay fairly dk gray to black, weaths dk blue
Sample 2 gray except upper .4 which is highly silty + withs lite green. ★ Lower foot ± leaves with orig. tissue preserved.

.4 Siltstone, argillaceous, gray weaths lite blue gray

6.4 Dark gray to black hard very silty, locally rich
Sample 3 2 shales up 2 clay, blocky to shaly fract. Lighter
Sample 4 0½ gray more plastic toward base.

.4 Argillaceous siltstone to fine ss.

20.2 Massive to x bedded ss, x lam.
(to 2 or 3 bed) ~~fine gr~~, weaths light buff to gray
Fine to med. grained local coarse laminae incl. chips white weathering.

3.0 Sandstone fine, hard, platey with ripmarked surfaces, beds. 1 to .6 thick. Argillaceous siltstone partings. Weaths lite gray irrey Fe brown stain.

Sample 5 1.5 Dk gray silty clay, weaths ~~dk~~ blue gray
" 1.8 Interbedded dk gray silty clay + platey ripple marked fine ss + siltstone.

~~~ disc.?

8.0 Massive fine grained sandstone.
(6 to 8 bed cuts off) x lam to more or less even near base, Weaths buff.

1.4 Sandy gray claystone + argill. fine ss sandstone

1.0 Massive bed fine gr. buff weath ss.
~~~

1.6 Plastic dk gray clay in upper .8, remainder silty clay to claystone, conch fract weaths gray to lite blue gray. few inches argill. siltstone at base.

Sample 6

2.1 Sandstone, fine gr as above (1.0)

Sample 7 1.6 Silty gray claystone locally some plastic clay.

2.5 Sandstone, fine gr. as above.

1.3 Interbedded argill. fine ss & siltstone in beds up to .2. grades to clay shale below.

Sample 8 1.7 Shale fine silty plastic clay dk gray weaths blue gray.

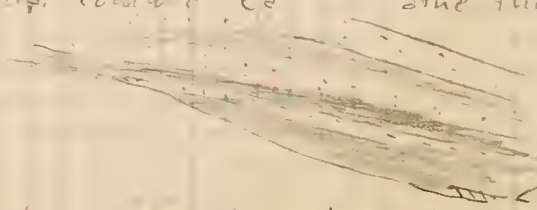
.3 Argill. fine ss & siltstone.

9 & 10 5.8 Fissile weathering dk gray to brownish (near b), silty clay shale., weaths dk gray.

2.0 Argill siltsta some interbedded silty shale weaths lite gray

discount

Note. The clay bed above is in a channel incised in the underlying Sa. — It pinches out completely up dip. [illegible] — the thin shales



* Locally has bentonite at base

above are so thin but not as much cut.

53.0 Fine and medium grained massive to xbedded, xlam sandstone. Hard, lite gray weaths, dk gray to Fe br. lichens. principal caprock of Hogback - both sides deep cr.

5.5 Continuous with unit above but has

Zones of coarse to finely cgl ss and clay fragments, also weathers buff to orange brown

3.5 Silty shale clay with thin interbeds + laminae siltstone. – weathers fissile lite gray

1.4 Flaky, shaley siltstone, minor silty sh. .2 of siliceous lite gray flint clay? at base

2.0 Dk gray finely silty plastic clay grading downward to silty brownish clay with silt laminae

5.5 Siltstone interbedded with silty shale beds of silt st up to .3 most thinner. Dk gray where shaley to lite gray or Fe stain where silt st.

2.8 Fissile silty sh + shaley siltstone. dk gray weths lite

.4 Siltstone irreg pkts fine ss, solid bed

1.8 Fissile silty shale, dk gray

21.0 Fine grained ss to dense siltstone, loc. argill, Massive, thin irreg beds weathers buff, spotted, with Fe, Mn stain on surfaces.

1.0 Argill; siltstone grading down to silty claystone

1.0 Dk gray finely silty clay, with 1/3" bentonite at base

1.0 Siltstone and silty dk gr claystone.

3.5 Argillaceous siltstone fine gr. SS. massive to irreg bed. weathers rounded dirty brn gray

1.2 Silty claystone [illegible] siltstone [illegible]

1.0 Argill siltstone, [illegible]

6.4 Siltstone, ~~shale~~ and Sil. shale interbedded. About .6 above base is .3 of flint [illegible] sorpy, between pore & bent.

15.8 Hard massive fine grained ss, Fe brown weath. local desert varnish. Fe specked.

12.7 Shale interval - covered by blocks ss, no [illegible] Jackdes, interbedded shale & thin ss [illegible] Clay [illegible] alt [illegible]

>14.3 [illegible] irreg thin bed & lam. x bed [illegible] irreg. interbedded siltstone. Floes bounded irreg sheeted outcrop. below upper 10' [illegible] some [illegible] clay flake cgl, coarse [illegible] Alternating bounded layers & [illegible] thin [illegible] bed, soft buff to gray & pinkish.

15.7 As above [illegible]
5.0 " "
20.0 Med um + fine to coarse & silty ss massive x lam. & x bed., weathers buff lichens.

Question never as to position of discont + base So. Platte.

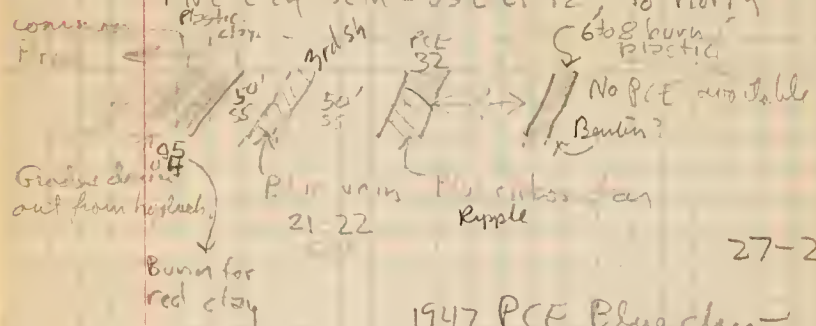
Golden Fire Brick Company — Mr. Mueller

Holdings see p 12 ts.

Mr. Mueller — Hogback N plant good. Common clay slice. Dry Creek Mine at Vera is abandoned in reserve. Old mine clay left.

Stope mining.

Fire clay vein — use at 12', to north




27-28

1947 PCE Blue clay — on calcined blue cone 28-29 2960 F.

(All tests Mellon Inst. of Indust. Research)

(Von Bibber)

Dry Creek 33-34 cone — this is highest test obtained on the Blue Ribbon vein.

Chemical analysis of scrap brick.

Mellon Inst.

| | | |
|---|---|---|
| Silica | 59.90 | #1 Golden Stiff Mud |
| Alumina | 35.49 | |
| Fe O | 2.37 | |
| Ti. | .1.10 | |
| Lime | 0.25 | |
| Mgo | 0.23 | |
| Alk. | .61 | PCE 32½-33 |
| | 99.97 | |

Pr. American Refractories Institute

W. J. Westphalen, pres.

Railroad Exchange Bldg

St. Louis, Mo.

For map.

1943

Refractories plants of the U.S.

Published by

J. H. H. Muirhead

230 W. 108 St.

New York, N.Y.

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Chem Anal. on Brick from Laramie Clay —

| | |
|---|---|
| Silica | 75.89 |
| | 19.08 |
| | 2.21 |
| | 0.56 |
| | 0.22 |
| | 0.26 |
| | 1.40 |
| | 99.62. |

D&C Co — [illegible] of white clay, — west of Bluebird — Coors uses some from [illegible] of Mt Vernon Canyon. Black silica.

F.C. vein Rw North - deep is NG

South - not in commercial quantity till Roxbury Pk.

Supplement #1 to Morrison section

Bluff N 35° E of Road intersection

[illegible] dk gray silty sh layers siltstone

12.5± Platy, [illegible] to the west, 18 siltstone & silty siltstone

6.0 Friable siltstone fine ss.

15.0± Fine to med gr lite gray to white sandstone with chips and blebs light gray white claystone, occasional round chert pebbles upper 6'. Then about 3' argillaceous ss, weathers out soft with blocky to subconch fracture, then [illegible] less argill, friable, [illegible] is massive, X lam. str [illegible] and inclusions of chert common in lower 10' [illegible] throughout. Weathers gray with buff, orange + local fe stains [illegible] Fe concs.

Chert looks indigenous to ss.

Slope covered

[illegible] (to S) [illegible] 3' [illegible] to 5± [illegible] claystone [illegible] the ss. (15.0 above) Section of this feature

ss, med to fine gr [illegible] loc. [illegible]

1.5± [illegible]

4.0 [illegible]

[illegible] Fe specks throughout

.5-2.0 [illegible] red stained Fe [illegible] ss as below

ss as in [illegible] 6'+ [illegible]

Looks like – 1. [illegible] above [illegible]

2. Chert [illegible]

Further S along slope - ss below argill zone is about 14' thick.

On slope above church

14'± lower part of ss - chert stringer bed

11.0 wash covered slope, trenching shows fine grained friable sandstone weathers orange Fe stain. May be arkosic. Grades down into interval below.

6.5 wash covered brand above zone red argill/arcose ss ~~& sandy claystone~~ at top. red ~~may be~~ is probably claystone below is gray sandy claystone with coarser spot red stained. lower part of interval obscured by slope wash.

11. Chiefly fine gr ss with Fe blebs in lower 6-8 ft weathers pitted surface, some clstn chips ? sandy obscured + Fe stained. [illegible] of fine ss + siltstone some with Fe blebs [illegible] size. [illegible] in [illegible]. Cgl of silty clstn chips in fine ss + siltstone.

Lower 1'± obscured - looks like grey weathered silty clstn with lenses fine ss

15' Red silty claystone with mottled purple + green [illegible] yellow at very base where weathered & pitted

5.8 Sandstone, fine gr, Fe specks massive, buff with pink cast x lam. Locally weathers - pitted

| | |
|---|---|
| 2.6 | Red silty to sandy claystone |
| 2.5 | Fine grained argill sandstone, red, ~~slaty~~ ~~shale~~ ~~shale~~ argill content, some bleached zone at top. |
| 1.0 | Red silty claystone |
| 2.0 ± | Fine sandstone buff, pitted for pinch. |
| .6 to 1.0 | Red silty claystone |
| 10.0 | Massive, x bedded ss, fine grained in upper 4'-then becoming medium with coarse x lam. and containing zones fine ss, even silty giving irreg banded appearance. Locally weathers pitted, some zone [illegible] coarse & blocks (less than 1') [illegible] pink at top, rest weathers light gray, with local punkish [illegible] |
| 3.0 | Red and green silty claystone & argill. siltstone. |
| 6.0 | Massive, fine grained, ss [illegible] to about (11.0) weathers pitted. |
| Use Discount | (Locally [illegible] [illegible] [illegible] [illegible]) |

Note — Plays red & green silty claystone comes out within these channel sands, and locally the shaley beds noted above pinch out.

| | |
|---|---|
| 7.7 | Green gray and yellow mottled claystone & silty claystone with local red within. |
| 7.1 to 8. | Fine to med & coarse massive x lam ss and cgl sandstone. Weathers light |

gray to buff, locally pinkish. Coarse & cgl layers include chert & granite [illegible] pebbles, also [illegible] clay pellets locally. Much Fe stain locally, some in blebs from 1/4 to 1/2 in diam, locally concentrated in concretions up to 3' in diam. [illegible] cgl layers

1.0' to 4.0 Green to red-tan, [illegible] gray, clay in, silty clay local lenses [illegible] fine ss in upper foot.

13 to 15' SS - fine grained, massive x-laminated weathers buff with pinkish zones & local pitted zones.

~~[illegible]~~

19'± Claystone (with [illegible]) about 1.5 to 2.0' gray at top, then maroon 3 to 4 feet, next green grading to gray & dk gray in lower 3'.

2.5 Concretionary? Zone of [illegible] Is? test Gray weathers like clay to crop with orange Fe stain. Coarse [illegible] No [illegible], very [illegible].

3.5 Dark gray claystone, hard with white spots, splotches & some pink specks. Silty & [illegible] 15

5.9 Fine grained ss with to [illegible] Brown weathers [illegible] at top grade up into claystone above. Is massive.

14 Slope [illegible]

Concretionary [illegible]

| | |
|---|---|
| 40'± | Claystone with cone 1s layers, all greenish gray |
| 14'± | Loose green & gray green siltstone with argill zones & 1'± silty light green claystone at top. Weathers concho to sub concho. fracture like limestone brown |

Alameda #2 (MN 50-19 (11))

From crest of hogback. S 8 E 2
from Alameda Pkwy - Morrison [illegible] section
start, then continued south from [illegible] type

4.0+ (Lower part only) Medium gr. cross laminated + cross bedded Fe blown to orange weathering. Lime 1'+ has intraform. cgl + local rolled lime chert pebble cgl.

Discont.

3.7 Claystone, silty, with interbeds siltstone, on lower part. Some tan, quartz silty platies [illegible]

2.0 ~~Hzto~~ SS, pipey, laminated [illegible] ripple marks on [illegible] surface. Fine grained, well [illegible] - [illegible]

1.3 Shaly clay at top with siltstone beds empty with Fe. ~~below~~ and basal bed lenticular? clay + lent. [illegible] [illegible] .2+. Fe-siltstone is hard, [illegible] can be [illegible]

5.2 Sandstone, fine to silt [illegible] fine. Fine maximum [illegible] in upper 2.1, then platey and silty with platey siltstone minor fine SS at bas. - grade [illegible] to shale [illegible] at the [illegible]

14.3 Sandstone, fine grained [illegible] irregular [illegible] weathering [illegible] [illegible] [illegible]

Discont.

8.6 Clay, black, silty, interbedded with siltstone, on upper 2.1, [illegible] fossil wood. [illegible] brown clay [illegible] to [illegible] [illegible] siltstone

30.0 Light gray to white fine-gr SS
Massive to very bedded, cross
laminated, local very beds siltstone
discont.

12 Clay, interbedded with platy
siltstone, no good exposure,
weathers slope. Bentonite about
4 ft from top - grey one. Siltstone
weathers Fe brown.

22.3 Fine grained SS. very interbedded
with, jones siltstone + argill.
siltstone, grey shale weathers gray
[illegible] with local fe stain zones.

24 Argill siltstone with interbeds
silty. ~~Clay~~, 10 to 14' from top
massive siltstone, 5.7 from top
is .2 of Reitbeck, upper 10'
~~stuff~~ base of fair clay up to 1' ±
Lower 10 [illegible] silt [illegible]
Shylen ptgs grading to SS below.
6' from base in [illegible] 6" pure clay is bentonite
Next interval was to SS [illegible]
measured.

1
1.8
2.5
1.0
1.3
2.1
2.8
.4
1.1
.4
1.4

15.1

1.5
1.7
1.5
1.6
1.2
1.6
4.3
3.7
1.6
3.3
1.8

[illegible]

MD 563

# Plainview section

Measured by tape from exposures in railroad cut of D&RGW, beginning about 1200 feet north of the crossing at Plainview, in the NE¼ NE¼ sec 12, T2S, R.71W., Jefferson Co., Colorado.

17.0 to 20+ — Interbedded fine to med SS with plastic clay, shelly to sandy, some good beds, SS in thin beds is Z

16.0 — Sandstone, medium to fine grained, in thin beds .2 to 4.0 in. Upper 5' more massive, x bed, Below these beds thinner, with finer grain, occ. sandstone. Shelly parting progressively more pronounced downward. Bedding surfaces of thin lower part are tops of worm casts? Bedding surfaces of most of interval are ripple marked. Resist .2 to .6 is lite gray very plastic clay with thin interbeds SS [Sample 1] This is same type clay as in [illegible] with SS in lower part this interval.

SS in upper 5 to 11 ft weathers buff to orange brown, lower thin bedded part lite gray weathers.

24.0 — Sandstone, massive medium grained x lam. weathers red-brown, rides washers.

Sha[illegible] cgl [illegible]

" " [illegible]

lower 1t. red. [illegible] + cgl

" [illegible]

[illegible]

[illegible].

local zone of Fe oxides brought. Bedding surfaces ripple marked + locally pitted where [illegible] pelecypod [illegible] trees weathered out.

Discont?

1.0 Sandstone, fine to med. irreg. bedded in thin beds .025 - .3, locally [illegible] + Fe impregs. Some layers argill + lite gray weath, others not argill + Fe rede to weath.

2.2 Sandstone [illegible] to [illegible] irreg. interbedded with thin beds gray, fissile highly plastic clay shale. Ss beds are chiefly fine gr argillaceous with worm trails on bedding surfaces. Upper .3 clay = [Sample 5]

5.8 Sandstone, medium grained, thin bedded, x bed + x lam in upper 2.0. Lower part massive x lam. Weathers buff. with rectangular [illegible]. Upper 2.0 has partings, interbedded softer ss. ([illegible])

3.0 (Interbedded) ~~argillaceous~~ siltstone with shale, ~~siltstone~~, ~~clayey siltstone~~ with one .6 bed of dk gray shale* 1.5 to 2.1 from top. Weathers light gray. .5 bed fossiliferous at top.

Shale w sample 6.

6.2 Shale dark gray silty with interbedded argillaceous silts [illegible] and siltstone laminae. Locally has conc. of pyrite siltstone. Basal .8 fossiliferous siltstone + fine ss interbedded well strat.

Sample 6 to 5 [illegible]

* has maroon streak

4.0 ± (base + about 1) Sandstone massive & dom. conglomeratic, med to coarse with scattered pebbles of chert & quartz up to 4.5" roundity. Lytle - Glencairn.

4.0 Siltstones siltstone & silty clay greenish but light gray weathering. Bit of dark brown red weathering sandstone in middle part; red and stained zones locally present.

3.0 ± Irregular lens, pl. areas bedded to massive. Fe saturated SS., weathers Fe brown. Locally cuts out against ss below

2.0 ± Irregular ss siltstone and silty clay as in 4.0 zone with some Fe stained silty streaks.

Discount? 22.0 Massive cross dom. med medium to fine grained SS with zones coarse grained. Light on fresh, buff weathering with some black stained surfaces. Less pronounced cut. Varies considerably in thickness. Fe stained red streaks zone about 1.6 to 1.0 [illegible]

Discount 15.0 (this last) Silty clay and [illegible] a few local lenses med SS. Upper 6' [illegible] green, tan, red mottling lower part red.

2.5 Lenses - reddish brown weath fine to med SS

.2 to 2.0 Red silty claystone mottled green (as above 15.0)

→ Note this interval varies [illegible] SS lenses in [illegible].

19.6 Massive med grained SS [illegible] coarse & [illegible] in thin [illegible] Fe brown, locally stained red by shale [illegible]

1.9
1.6
.7
1.7
2.2
.2

Discont

4.7 Silty clstn & argill. siltstone (at top) upper 1' green, rest red; ~~grades to lim yellow~~ grades to unit below

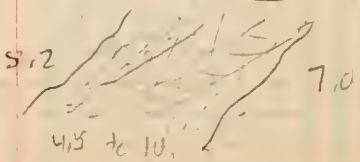
1.0 to 5.0 Interbedded siltstone and silty claystone. Siltstone in beds 1.± thick, [illegible] - buff [illegible] weathers. dense [illegible] expression, and to friable. Claystone chiefly red, green mottling some buffy-silty yellow. Locally (N side Vrooks) only 1 siltstone bed 1'+ in this interval

9.0± (Near where interval above only 1 [illegible])
Red silty claystone

8.2 Sandstone with interbeds green silty claystone. Upper 1.5 ~~[illegible]~~ hard [illegible] are chiefly siltstone, argill, some .4 thick, than thicker beds [illegible] SS [illegible] with clstn interbeds, locally [illegible] SS beds merge. SS weathers buff & Fe stained. [illegible] from shale above.
Local lenses med SS with [illegible] pebble congl. [illegible]

Discont

4.5 to 10± Gray to greenish silty claystone and argill silt. Soft [illegible] some [illegible] with some [illegible] thin beds SS. Locally (S) tracks) interval is a channel fill with [illegible] green [illegible] & yellow [illegible]




Where 4.3 to 10± [illegible]

7.0 Sandstone, friable massive, appreciable Fe specked, fine - med - coarse, grained,

Discont.

11.0 Silty clay (mottled) red + green

7.2 → Clay, silty, gray to green

Upper 1' concretionary silty claystone green to gray Fe cement, red gray + green silty clay.

5.5
1.1
2.6
3.3
5.4
18.2

Sandstone, upper 5.8 fine gr. crossbedded locally silty at top, some 1B clayst. at top. remainder conglomeratic ss and cgl. Constituents include chert, quartzite. 2nd day fragments.

3.0 wash Green claystone end out.

6
3
5
9
17

Golden Fire Brick
#A. Pick section of Seed head [illegible]
between DFB Co drop and [illegible] Co
fence.
From west wall quarry surface - main fill
clay bed

4.0 Upper 2.5 is - argill sediment
Cap on top 1.0 thin 1.5 dk brn gray
silty clay shale.
1.5 below is, + uneq. ss.

1.0 Interbrd. silt — clayish + thin silt stn

4+5' Upper 2.5 is dk gray fissile weath. cl. shale
lower part obscurer

1.0± Hard [illegible] gr. SS. Buff weathering

8.5 Obscured, clearly shaly many a
few thin sandy + fine ss beds.

18.0± SS, fine to med. gr. [illegible]
X'ed + X'ing, some [illegible]
[illegible].

57' approx. meas. Observed - upper [illegible]
[illegible] to 1' [illegible] top. [illegible] 11'+
[illegible] contains as [illegible]
(Fe stained + uneq. SS) [illegible]
[illegible] platy med gr. SS + [illegible]
[illegible]
[illegible] platy [illegible]

10.1

43.7

13' Sandstone, [illegible] to medium. Ign. to [illegible] bed x bed x [illegible]. Lots of [illegible] weathering to orange brown

16' Covered - [illegible] x [illegible] shale [illegible]

3.4 Platy fine SS with plant [illegible] plant frags.

4.0 Covered, shale [illegible] covered.

1.6 Massive fine to med SS, coarse to [illegible] cgl [illegible] pebbles.

2.4 [illegible] Shale with [illegible] sand [illegible] — Covered

4.5 [illegible] to med [illegible] SS [illegible] weathering [illegible] to dark [illegible]

2.2 ? Gray to dk gray silty shale

1.3 Top H 10.6 bed SS ± lite gray coarse grained [illegible] below, silty [illegible] grading to sandy to [illegible] interval

3.2 FM
3.2 FM
37-½ FM } Sandstone fine to med grained [illegible] x lam [illegible] gray. Few coarse [illegible], minor interbedded cgl.

10± Covered [illegible] stop, prob some interbedded SS.

8.3 Massive, x lam, lite gray weath SS stringer [illegible] pebble cgl [illegible] coarse

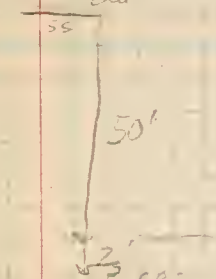
17.0 Covered

4.0 Mostly cgl [illegible] x bed SS

1

Golden Eye Beach

#B — A. tape measurement along slope from base of clay under uppermost cgl. bed slope at + bedding, hard to direct measurement possible —




Mossy-highly cliff 53' at base center A. 53' ones to first heavy bed about in the 53. From this bed 61' to [illegible] cgl. [illegible] direct point [illegible] 53

Deer Creek #2

From base of crest-forming SS northwestward hogback (see map)

Here the SS (one below three coal veins) is equally thick as in D.C. #1 — Sheer cliff 50'± then parting & local lense .0 — 3.0 of silty clsts & interbedded [illegible] 3 to 5 feet of SS. The lower part of upper [illegible] of 50' is full of coarse to fine qtzl SS & ~~f~~ qtl.

Discont.

Shale silty dark gray to ~~dk~~ brn gray, weathers fissile, olive gray, to light olive gray. Has interbeds — siltstone

3.0 with siltstone, argill. & 1.0 silty sh. with sr + laminae

4.0 Silty shale, laminae silt.

.2 [illegible] [Sample 1]

1.0 Silty brown clay

.2 Bent.

3.0 Silty dk sh siltstone

.4 Fine Fe stained ss.

3.7 1.B s[illegible] s + siltst [illegible]

1.5 Siltstone, [illegible] irregular [illegible] to pieces [illegible] black [illegible]

4.0 1B silty sh + s[illegible]

0.6 [illegible] with silt lam. [illegible] hard silty ledge

3.0 Dk gray silty sh, thin beds [illegible] in lower part

24.6

17.2 Sandstone, fine gr. silty, ~~sd~~ [illegible], irreg. weathering, lite [illegible] [illegible] siltstone [illegible]

2.6 Argillaceous s[illegible] [illegible] continuous with [illegible]

argill. zone of [illegible]

10.0 Interbedded silty [illegible] (12 [illegible]) [illegible]
zones argill. siltstone [illegible] slate
dk gray layers of silty clstn. [illegible]
2.0' fine gr ss, [illegible]

0.9 Shaley zone. at base interbed above
0.3 Silty gray shale and lb argill. siltstone
0.4 Bentonitic clay? (Sample 2) [Sample 2]
0.2 rusty weath silt & sand

7.5 Sandstone massive fine gr to med. Fe spotted
friable to crumbly, weaths orange
brown. Fe ptys sandy sh.

3.3 Silty dk gr to bl shale, upper 3
shaly siltstn.

7.2 lb silty gray clay & thin beds gray
argill. siltstone

8.0 lb siltstone [illegible] occasional,
siltstone [illegible]

3.0 Sandstone massive bed at med gr
lt gr to buff weath

4.7. 1.8. argill. [illegible], silty clstn, sandy
at top.
1.4 - silty + sandy clstn
.3 - argill siltstn
3.0 - silty sh + argill siltstone
whole lt gr to lt blue gr weath.

7.4 Sandstone interbedded fine, small
platy to [illegible] lam. and [illegible]
med. to coarse.

descent →

See attck 6
p. 29 (b)
(s) [illegible]
(w) [illegible] northern [illegible]

Breakdown.

2.0+ Massive [illegible] coarse buff [illegible] with Xylum

2.4 Platey [illegible] zone, [illegible] to [illegible] mountain

1.0 Massive [illegible] coarse [illegible] [illegible] cgl.

2.0 Low zone [illegible] to [illegible] below.

Discont. top Lytle is approx. 14 this interval

10.5 Shale, Dk. grey to black, silty, fissile

upper 7 weath. with [illegible] few beds [illegible]

Siltstone [illegible] 0.6 [illegible] Shale [illegible]

lower 4' [illegible] more [illegible]

3.5 Shale is above with beds [illegible] common

[illegible] fine gr. ss 0.4 thick [illegible]

1.0 above base, [illegible] 1.0 [illegible]

23.5 Sandstone, [illegible], med-[illegible] [illegible]

light grey, to [illegible]

occasional [illegible]. The cy. [illegible]

basal 10 [illegible] stringers throughout

Marked unconf at base. Cgl [illegible]

chert [illegible] clasts, some [illegible]

up to 0.3 diam. [illegible]

isolated [illegible] not in [illegible]

[illegible] most common.

Unconf.

7.0 to 9.0 Siltstone, [illegible] silty [illegible]

[illegible] weath., [illegible], with

beds [illegible]

[illegible]

0 to 1.6, [illegible] silt

[illegible] [illegible]

few ss.

5.0. [illegible]

[illegible] and [illegible]

[illegible]

| | |
|---|---|
| 3.0 | Sandstone, fine gr, massive weathers orange brown is heavily Fe speckled. |
| 3.4 | Basal 4 is angell silt/sh parting Sandstone as above, bigger Fe specks. locally pitted, same med gr. |
| Dis out | |
| 5.0 | Silty claystone & argillaceous siltstone with bed 1 foot above light gray fine ss, 2.0 from top. claystone above are red, brown gray, [illegible] along strike. the red claystone thickens locally to 6' with 1' green at top |
| 12.8 | Sandstone, fine to med gr, variable in thickness. local silty zones at base & top. From 4 to at least 15' thick in [illegible] |
| Dis out | |
| 6.5 | Silty claystone, chiefly red brown Green mottling top & base Gastrolith in upper 1' |
| 8.5 | Sandstone, massive cross bedded, fine to coarse with some calcite & insol. red layer tops, under pebbly at contact |
| Discont. | |
| 25.0 | Alternating beds of silty claystone and [illegible] argillaceous siltstone, [illegible] red gray with [illegible] green [illegible] red mottling [illegible] |
| 3.0 | Massive argill siltstone & fine ss red to [illegible] |
| 5.0 | Silty claystone & argillaceous [illegible] |

minor gray at top

8. Massive [illegible] sandstone, pink, red, & yellow gray, grades to interval [illegible].

36.6 Sandstone, upper 10' medium wet [illegible] well-sorted [illegible] Lower remainder mud & coal & [illegible] with good cyl.
Whole massive, weakly pink to buff
Total 5 to 6 [illegible] cyl.

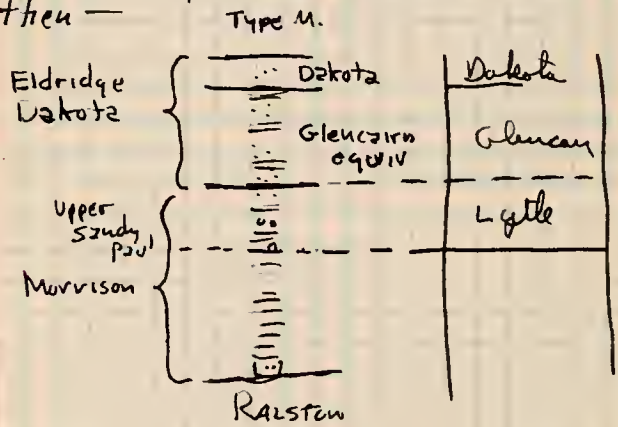
Below typical green Morrison beds

Lee's correlations

Obvious that – 1. Lee did not find his lower shale and lower & middle ss easy to pick out in Denver basin area. 2. At Turkey Creek he put upper sandy part Morrison as his lower & middle ss of Dakota.

At type Morrison he was confused and had to misinterpret Eldridge to make his idea of section fit that of Eldridge. Actually his lower ss, lower sh, & middle ss correlate with the upper sandy part of the type Morrison.

Assuming his other correlations correct then —




Also – the sandy upper part type Morrison = Cloverly and Lakota – Fuson.

Fall River is prob ss that is only 10' ± at type Morrison area + sits on sh. overlying basal Dak cgl. This ss thickens to north + is ± 60 at Eldorado Spgs.

Canon City trip with Knechtel (July 23 thru 25)

First stop - Skyline drive. Observed sequence same
23 as that in Denver basin with Glencairn member basal cgl. on Lytle. Base Lytle cgl. Lytle locally picks up green claystone interbeds. Glencairn has ss like the platey ss under shale #3 and a thin shale zone between it and the basal cgl. Also looked at Greneros, Greenhorn, Carlisle & Niobrara

24 Morning - Stone City, Codell & Timpas on rim across from Dry Creek - C. Then exposures in Dry Creek Canyon & Spring canyon.
Afternoon - Rock Creek - in slope mine to see thick clay back thru Beulah, Florence

25 Morning - Oil Creek Section
Lytle - Glencairn contact on 115, this exposure also shows red beds locally in Lytle.
Type Lytle - brief look from distance. Type exposes only massive sandstn. & cgl of section & is poor as no contacts shown
Colo Spgs - Garden of Gods - Dakota pzrt. Faulted out locally.
Back to Federal Center

Belvue trip - with Knechtel July 26

Stopped at 4-mile section - no basal Glen cgl.

Saw type Lycus, + Jelm(?) and Entrada (?) along St Vrain Cr. May be section top + base Dakota in this area.

Belvue section of Lee along irrigation ditch. Excellent exposures of most of section. Glencairn fossils. No basal cgl seen. Ditch will be dry by mid. August at which time section in detail.

Owl Creek Canyon - Poor exposures. No place for section.

Box Elder Cr. - Fairly good exposures of upper ss part upper Glen. Graybull equiv, basal Glen cgl, the Lytle + Morrison - worth a section.

Spring Canyon dam site - Excellent exposure of al but lower shaly part Glen above Graybull equiv. Section. Check Dixon + Soldier Canyons to north, which have also been dammed.

Sections to be measured in Farmer

Belvue (+ sample)
Box Elder Cr.
Spring Canyon

Finlay (1916) = Lytle and Glenzairn

Lytle - page 8.

The Lytle sandstone member, which is named from Lytle in the valley of Turkey Creek, consists of sandstone and interbedded beds of grit and shale. Its base is generally marked by a coarse massive sandstone 15 feet or less thick composed of prevailingly siliceous white, yellowish-brown, or blackish grains. The average diameter of these grains is about an eighth of an inch, but the largest fragments are an inch across. In some places, as near Colorado City, the base of the member consists of fine-grained white or cream colored sandstone 100 feet thick. The Lytle member contains pebbly beds at several horizons and scattered lenses of greenish or reddish clay near the top. The pebbly layers, which are separated by beds of fine grained white sandstone, are abundant in the uppermost 50 feet. The average thickness of the member is 145 feet.

Glenzairn page 8

The Glenzairn shale member, so named from a tract of land a few miles north of Lytle, consists of dark shale and a little sandstone and is rather sharply separated from the Lytle member. The best section is in the railroad cut near Bear Creek. The base of the member consists of 12 feet of purplish-black shale, much cracked and broken, having veins of gypsum, the largest a quarter of an inch thick in the cracks.

The succeeding 18 feet consists of grayish sandy shale with layers of fine grained gray or yellow sandstone an inch thick. Above is 40 feet of purplish-black shale like that at the base, succeeded by 15 feet of drab clay. About 110 feet above the base is a bed of friable fine-grained, ochre-stained sandstone 18 inches thick, overlain by a few feet of light brown clay. The uppermost 25 feet consists of paper-thin layers of purplish-black shale with gypsum filled cracks. The member attains its maximum thickness near Colorado City, where it is 145 feet thick, but in the southern part of the quadrangle it is much thinner and in places measures less than 10 feet.

Dakota — Shows Dry Creek Canyon member present in Bear Creek section — which must be good!

Richardson (1915) - Recognizes Purgatoire and its members in Perry Park. Does not separate members as exposures too poor. Glenrock equivalent apparently chiefly shale as at type.

Stose, (1912)

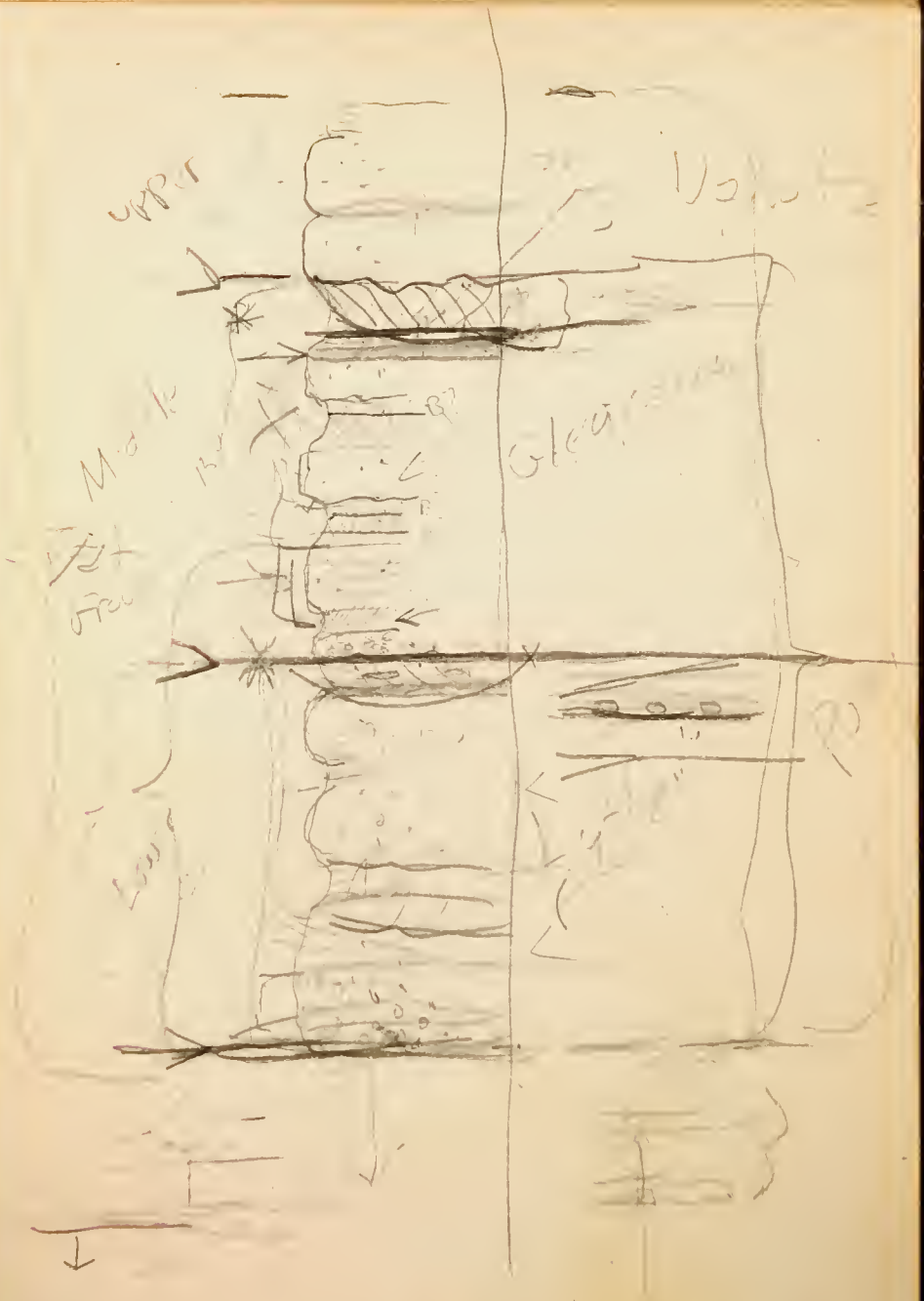
Purgatoire formation. (p. 3) — The Purgatoire formation, which is composed largely of sandstone, was formerly regarded as part of the Dakota sandstone and is so

Introd.
History
Physical description
~~Stratigraphic terminology~~
Local correlation with other zones.
[illegible] analogs for outcropping
~~northern~~ 'circular' west of Front Range

mapped in the Pueblo and Walsenburg folios.
— — — (On history of separation) — —
The formation takes its name from Purgatoire Canyon in the Mesa de Maya quadrangle.
Goes on with page of detailed description that shows some difference with Glencairn-Lytle sequence, but gets what appears to be Glencairn cgl. with fish remains in it. Possibly one section would help tie this in.

Cloverly — See Wilmerth. (original description by Darton 1904 in G.S.A. Bull vol. 15, pp. 399-401) SEE CARD FILE
See also Greyboll sandstone member in Wilmerth. This is probably the basal Glencairn sandstone.

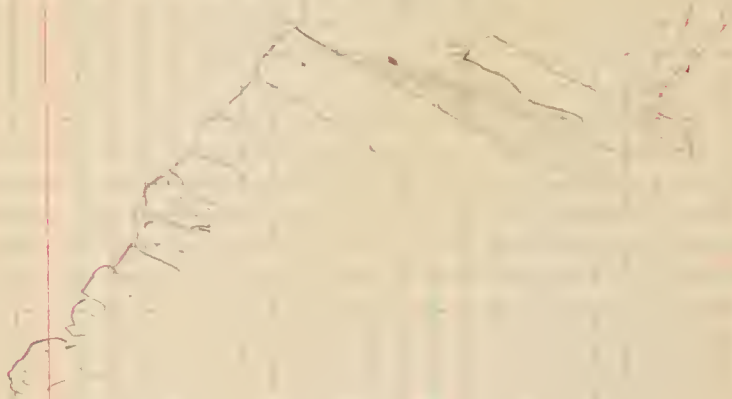
| | |
|---|---|
| Levemic ① | N 18° W, 56° W overturned |
| Glencoe ② | N 10° W, φ |
| Fault ③ | Trend N67E ±⊥ |

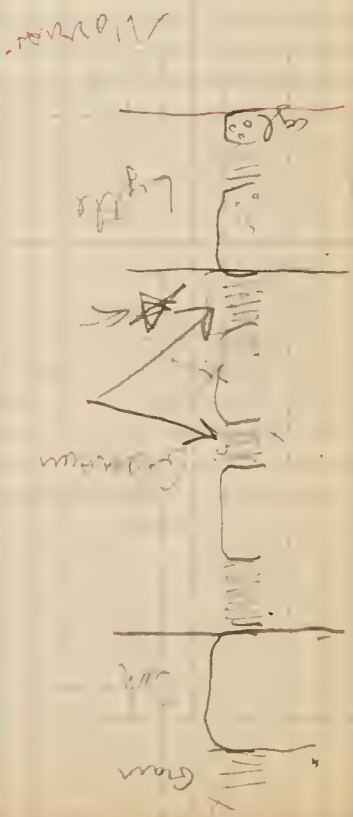


Upper ss
Md sh
Mid ss
Lower sh
Lower ss

Newcastle
Stuart
Fall River

Fusan
Latob





[illegible]
1 [illegible]
2 thru 5 - Pulling [illegible]
2 [illegible]
Middle [illegible]
3 [illegible]
4. L. sh.
5. Monroe [illegible]
6. John Morrison [illegible]
[illegible]
[illegible]

7. [illegible] N. side
The 2 highest
1 top [illegible]
2nd top [illegible]
8. Looking North [illegible]
at Bullo [illegible]
Entrada? [illegible] over
John
9. Spring Canyon road cut
10 " " "

Van Bibber Creek

Dup. ate section - upper part of ~~[illegible]~~ clay beds, Yzcu in N. end of old workings.

- Sandstone uncont.

.6 Silty sh + argill, siltstone

.8 Dark gray silty clay shale → sh. clay (Sample 15)

3.9 Sandstone, hard, light gray, fine grained cross-laminated, weathered lite butt to Fe br.

Disconf.

1.2 Dark gray argillaceous siltstone, grades laterally into silty clay (Sample 14)

1.2 Siltstone, gray, argillaceous

1.2 Sandstone fine gr. sec., hard x lam. weath. butt to brown.

Sample 13 { .8 Gray silty clay (indurated

.6 Argillaceous siltstone gray

.8 Gray silty clay

6.3 Sandstone, Hard fine gr. x lam. gray, butt to Fe brown. Breaks up to 2' thick

2.8 Clay Gray, plastic (dry) locally silty upper, fad d base, sl. [illegible] to thick (Sample 12)

2.0 Sandstone, some interbed. clay in upper part. Fine gr. platey locally beds to 10' thick.

1' Clay - Gray clay plastic crags, silty layers, Fe stain

0.3 Sandstone = 3' bed over main clay.